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NOTES ON THE BIOLOGY OF THE POTONIINE SHRIMP *LIPKEBE HOLTHUISI* CHACE, WITH A DESCRIPTION OF THE MALE[1]

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Chace (1969) first described the pontoniine shrimp, *Lipkebe holthuisi*, from two female specimens collected from the Gulf of Mexico, off the coast of Florida at a depth of 119 m. A second occurrence of this shrimp was reported by Bruce (1976a) from off Brazil; only a single specimen, an ovigerous female, was noted. To our knowledge no male has been discovered. This paper reports on a series of collections of *L. holthuisi* from the eastern Gulf of Mexico. Included is a description of the male from three specimens, and the commensal relationship of *L. holthuisi* with the crinoid *Comactinia meridionalis meridionalis* (Agassiz) from 150 m depth.

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Lipkebe holthuisi Chace, 1969

Figures 1–2

Lipkebe holthuisi Chace, 1969:263–266, figs. 8–9; 1972:25.—Bruce, 1976a: 310–312, figs. 1–2.

Material examined.—Oregon Station 1024, 1 ovig. ♀ (holotype, USNM 97433), 25°13′N 83°55′W, 119 m, 19 April 1954. MAFLA Station 15-I-B, 1 ovig. ♀, 26°25′N 83°49′W, 150 m, 28 July 1975. MAFLA Station 33-I-B, 7 females (5 ovig., 1 with bopyrid isopod), 2 males (3.3 mm, 2.8 mm USNM 168535), 26°25′N 83°50′W, 150 m, 28 Feb. 1976. MAFLA Station 46-310201, 2 females (1 ovig. 3.6 mm, 2.9 mm USNM 168534), 1♂, 26°24′30″N 83°49′30″W, 150 m, 15 July 1976.

Morphology.—The ovigerous female specimens agree with the description of Chace (1969) and no additions are included. However, the male specimens of *Lipkebe holthuisi* differ from the females in the size and shape of the carapace and second pereiopods (Fig. 1). As in the ovigerous female, the rostrum extends to the distal end of the antennular

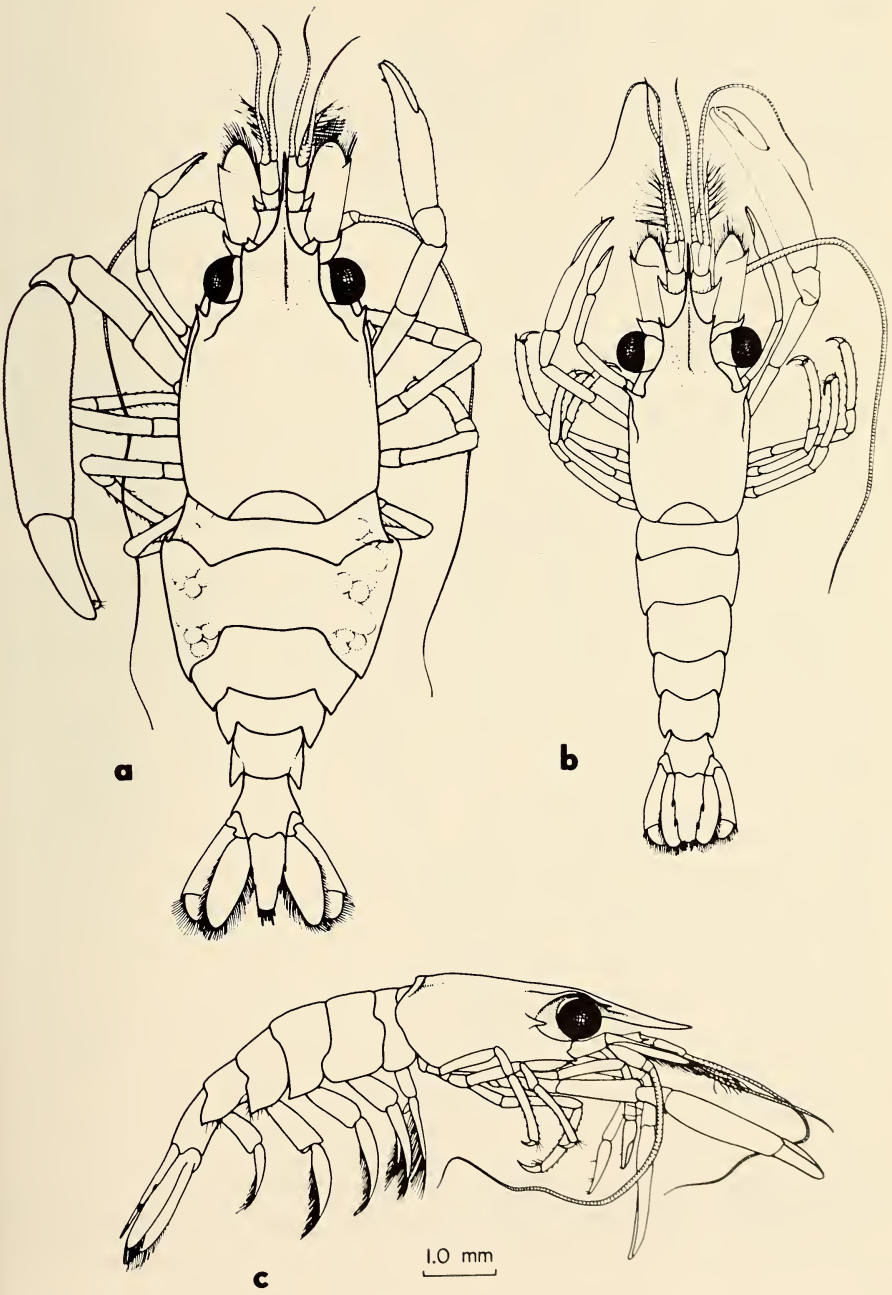

Fig. 1. *Lipkebe holthuisi*: a, Ovigerous female; b, c, Male.

peduncle and is laterally compressed in the distal half. When viewed laterally, the carapace is more in line with the rostrum of the male than in the ovigerous female, where it appears distended. The carapace is reduced in length relative to the abdomen and much more depressed than in the ovigerous female; it is compressed laterally. The lateral antennular flagellum of the larger male appears slightly longer than that of the female; it is nearly twice the length of the internal antennular flagellum.

The second pereiopods of the male are, as in the female, very unequal and dissimilar. However, the major cheliped of the male is less robust, the palm being compressed laterally. It over-reaches the antennal scale by the chela and only part of the carpus. The fingers are less than half as long as the palm in the smaller specimens, increasing to slightly longer than half the palm in the largest male. The dactyl is similar to that of the female, having a large basal tooth closing into a depression within the fixed finger. The merus, carpus, and propodus contain the minute tubercles depicted by Chace (1969: fig. 9b, 3). The minor cheliped is slightly shorter than that of the female, extending beyond the antennal scale by less than the full length of the chela. As in the female, the fingers are 0.7 as long as the palm and unarmed.

Bruce (1976a) noted that the small spinules on the ventral border of the dactyls of the ambulatory pereiopods (Chace, 1969: fig. 9g, i, k) are not discernible. These are distinctly present in all specimens from the Gulf of Mexico. The specimen from Brazil also seems to have many more long, coarsely plumose setae in groups on the distal ends of the propodus of these limbs than do the specimens from off the coast of Florida.

The immature female resemble the male and is distinguishable only by its secondary sexual characters. These characters are illustrated for both the male and female in fig. 2. The margin of the endopod of the first male pleopod is entire, not bilobate. Up to 3 small setal spines (asetes) project medially from the margin. The appendix masculina on the second pleopod of the largest male has a setal combination of 3, 3, 6; apical, subapical, lateral (Fig. 2c). The apical setae originate from a straight tip and extend by ⅓ their length beyond the small, rounded appendix interna. The setation of the first and second pleopods of the males is summarized in Table 1. These follow the characters evaluated by Fleming (1969) for male external genitalia of certain species of *Palaemonetes*. As noted in Table 1, addition of setae occurs with an increase in body size of the male. The setae present on the appendix interna on the second pleopod of females (Fig. 2e, f) range from none in the small, immature females to 6 in the largest ovigerous female. As in the male, the numbers of setae increase as the body size of the female increases (Table 2).

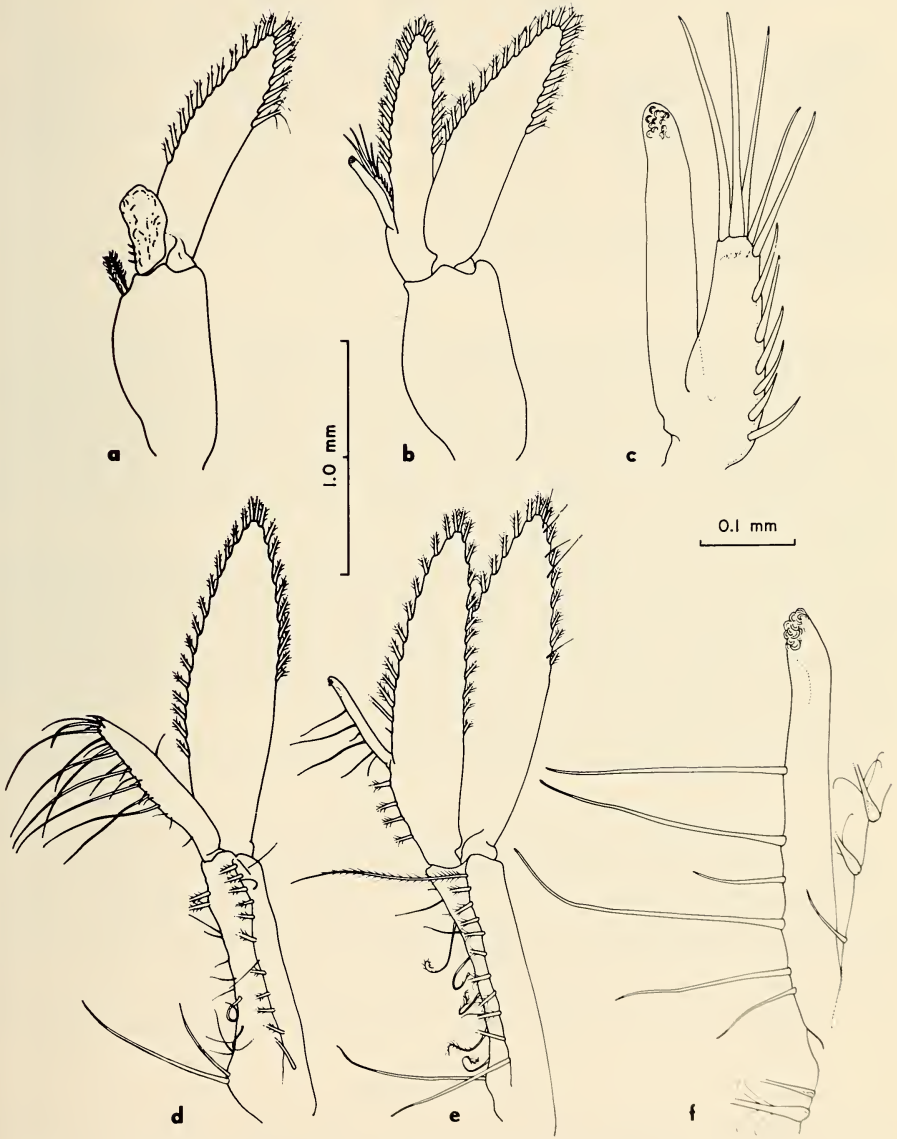

Fig. 2. *Lipkebe holthuisi*: a, Male, first pleopod; b, Male, second pleopod; c, Male, appendix masculina; d, Female, first pleopod; e, Female, second pleopod; f, Female, appendix interna. a, b, d, e, Scale = 1.0 mm; c, f, scale = 0.1 mm.

Table 1. Male characters of the first and second pleopods of *Lipkebe holthuisi*.

Carapace length (mm)	first pleopod endopod	Number of setae: second pleopod, appendix masculina		
		lateral	subapical	apical
3.3	3	6	3	3
2.8	2	6	1(2)*	2
2.8	1	5	1	2

* (2) from right pleopod.

Remarks.—The carapace lengths of the males range from 2.8 to 3.3 mm. The females range 2.9 to 4.6 mm. One female bears an undescribed bopyrid isopod of the genus *Bopyrina* Kossman, 1881, within its right branchial chamber. This species is being described by one of the authors (RWH). In comparing the shrimp with the non-parasitized females, no alterations of the secondary sex characters were found; however, this is the only non-ovigerous female over 3.0 mm in length.

The color of live *Lipkebe holthuisi* is a deep crimson hue, blending naturally with its commensal host, *Comactinia meridionalis meriodionals.* Some shrimp were preserved within the arms of the crinoid, which was collected in large numbers. A single living shrimp was observed with its host for a short time in an aquarium. It moved about only on the oral plate and not on the arms of the crinoid.

Distribution.—Lipkebe holthuisi occurs in the western North Atlantic

Table 2. Female characters of the second pleopods of *Lipkebe holthuisi*.

Carapace length (mm)	second pleopod, appendix interna (number of setae)
4.6	6
4.4*†	5
4.2	5
3.9	3
3.9	2
3.8	4
3.6	3
3.4	2
2.9*	0
2.9*	0

* Non-ovigerous.

† With branchial bopyrid isopod.

from the southeastern Gulf of Mexico and the western South Atlantic off the coast of Brazil; 64–150 m depth. Off the coast of Florida it is associated with the crinoid *Comactinia meridionalis meridionalis*.

Discussion.—The genus *Lipkebe* appears to be related to the genera *Pontonides* Borradaile, *Neopontonides* Holthuis, *Veleronia* Holthuis, and *Pseudocoutierea* Holthuis, which are associated with gorgonians and antipatharians, and the probably commensal genus *Coutierea* Nobili, whose host is not known (Bruce, 1976a; Chace, 1972). From the similarity in form of the dactylus of ambulatory pereiopods in the aforementioned genera, Bruce (loc. cit.) suggested a similar type of host for *L. holthuisi*. The association of *L. holthuisi* with a crinoid may extend the possibilities for the commensal host of *Coutierea*.

The accounts of caridean shrimp commensal on crinoid hosts are well documented. Potts (1915) included the behavioral activity and color variations of the Pontoniinae and Alpheidae commensal on their crinoid hosts. More recently, Bruce (1965; 1971) provided invaluable information on the crinoid associates of the Indo-Pacific species of *Periclimenes* and other pontoniine-crinoid associations. Fishelson (1974) observed the cryptic behavior and coloration of three pontoniine shrimp on crinoids from the Red Sea and noted their mode of feeding. In his review of the commensalism of coral reef Caridea, Bruce (1976b) listed 5 genera of the Pontoniinae and the genus *Synalpheus* as commensals occurring on crinoid hosts. Additional observations on the alpheid associations with the crinoid *Comatularum* group from the Indo-Pacific were discussed by Banner and Banner (1975), who included notes on color variations, behavioral activity, and host specificity. Recent records of pontoniine-crinoid associations from the Western Atlantic are found in the descriptions of *Periclimenes bowmani*, *P. crinoidalis*, and *P. meyeri* by Chace (1972).

Of interest is the specificity of *Lipkebe holthuisi* to the crinoid *Comactinia m. meridionalis*. A smaller, yellow crinoid, *Leptonemaster venustus* Clarke, co-occurs with *C. m. meridionalis*, but no shrimp were collected from it. All specimens of *L. holthuisi* were colored to blend with their host, a deep crimson. There was no variability in color of the shrimp to suggest a different or additional host, as indicated by Potts (1915).

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Footnote

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